

Application Serial No.: 10/799,504
Attorney Docket No.: 0160116

List of Claims:

Claim 1 (Currently Amended): A method for recovering an ~~erased voice~~ a speech frame, the method comprising:

obtaining a first current input speech frame, ~~said frame having a start point and an endpoint;~~

reconstructing said first current input speech frame from a previous input speech frame to generate a reconstructed first current input speech frame if in response to an indication that said first current input speech frame is lost has not been properly received;

obtaining a second current input speech frame immediately following said first current input speech frame;

~~creating a time-warped current input speech frame and a time-warped reconstructed frame from previous input speech frame by continuously time warping said second current input speech frame and a copy of said previous reconstructed first current input speech frame to coincide a peak of said second current input speech frame with a peak of said reconstructed first current input speech frame while maintaining an intersection point of said second current input speech frame with a third current input speech frame immediately following said second current input speech frame, wherein said time warping generates a time-warped second current input speech frame and a time-warped reconstructed first current input speech frame if said current input speech frame is correctly received and said previous input speech frame is reconstructed; and~~

creating a new second current input speech frame by overlapping-and-adding said time-warped second current input speech frame and said time-warped reconstructed first current input

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~~speech frame fading simultaneously said time-warped current input speech frame and said time-warped reconstructed frame from previous input speech frame to obtain an improved current frame.~~

Claim 2 (Currently Amended): The method of claim 1, wherein each of said speech frame ~~comprises~~ represents a speech signal having zero or more pitch cycles.

Claim 3 (Currently Amended): The method of claim 2, wherein said ~~continuously~~ time warping said ~~current input speech frame and said copy of said previous input speech frame~~ comprises shifting one or more peaks of said pitch cycles of said second current input speech frame and one or more peaks of said pitch cycles of said ~~copy of previous~~ reconstructed first current input speech frame to ~~provide overlap of~~ coincide at least one of said one or more pitch cycles peaks.

Claim 4 (Currently Amended): The method of claim 2 1, wherein said overlapping-and-adding fades-in said second current input speech frame and fades-out said reconstructed first current input speech frame ~~endpoint of said current input speech frame remains fixed during said time-warping process.~~

Claim 5 (Currently Amended): The method of claim 1, wherein said reconstructing said first current input speech frame from a previous input speech frame comprises copying said

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previous input speech frame as said reconstructed first current input speech frame.

Claim 6 (Currently Amended): The method of claim 1, wherein said previous input speech frame immediately precedes said first current input speech frame ~~fading simultaneously said time-warped current input speech frame and said time-warped reconstructed frame~~ comprises:

~~fading in said time-warped current input speech frame; and~~
~~fading out said time-warped reconstructed frame of said copy of said previous input speech frame.~~

Claim 7 (Currently Amended): The method of claim 1, wherein said fading overlapping-and-adding is a linear fade operation.

Claim 8 (Currently Amended): An apparatus for recovering an ~~erased voice~~ a speech frame, the apparatus comprising:

a receiver for obtaining a first current input speech frame and a second current input speech frame immediately following said first current input speech frame, ~~said frame having a start point and an endpoint; and~~

~~a decoder for synthesizing speech from said input speech frame, said decoder synthesizing said input speech by:~~

a reconstruction element for reconstructing said first current input speech frame from a previous input speech frame to generate a reconstructed first current input speech frame ~~if in~~

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response to an indication that said first current input speech frame is lost has not been properly received;

~~creating a time-warped current input speech frame and a time-warped reconstructed frame from previous input speech frame by continuously a time warping element for time warping said second current input speech frame and a copy of said previous reconstructed first current input speech frame to coincide a peak of said second current input speech frame with a peak of said reconstructed first current input speech frame while maintaining an intersection point of said second current input speech frame with a third current input speech frame immediately following said second current input speech frame, wherein said time warping element generates a time-warped second current input speech frame and a time-warped reconstructed first current input speech frame if said current input speech frame is correctly received and said previous input speech frame is reconstructed; and~~

~~an overlap-and-add element for creating a new second current input speech frame by overlapping-and-adding said time-warped second current input speech frame and said time-warped reconstructed first current input speech frame fading simultaneously said time-warped current input speech frame and said time-warped reconstructed frame from previous input speech frame to obtain an improved current frame.~~

Claim 9 (Currently Amended): The apparatus of claim 8, wherein each of said speech frame ~~comprises~~ represents a speech signal having zero or more pitch cycles.

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Claim 10 (Currently Amended): The apparatus of claim 9, wherein said ~~continuously~~ time warping said ~~current input speech frame and said copy of said previous input speech~~ comprises shifting one or more peaks of said pitch cycles of said second current input speech frame and one or more peaks of said pitch cycles of said ~~copy of previous~~ reconstructed first current input speech frame to ~~provide overlap of~~ coincide at least one of said one or more pitch cycles peaks.

Claim 11 (Currently Amended): The apparatus of claim 9 8, wherein said overlapping- and-adding fades-in said second current input speech frame and fades-out said reconstructed first current input speech frame ~~endpoint of said current input speech frame remains fixed during said time warping process.~~

Claim 12 (Currently Amended): The apparatus of claim 8, wherein said reconstructing said first current input speech frame from a previous input speech frame comprises copying said previous input speech frame as said reconstructed first current input speech frame.

Claim 13 (Currently Amended): The apparatus of claim 8, wherein said previous input speech frame immediately precedes said first current input speech frame ~~said fading simultaneously said time-warped current input speech frame and said time-warped copy of previous input speech~~ ~~comprises:~~

~~fading in said time-warped current input speech frame; and~~
~~fading out said time-warped copy of previous input speech.~~

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Claim 14 (Currently Amended): The apparatus of claim 8, wherein said ~~fading~~
overlapping-and-adding is a linear fade operation.

Claim 15 (Currently Amended): A computer program product comprising:
a computer usable medium having computer readable program code embodied therein ~~for~~
~~recovering an erased voiced speech frame~~, said computer readable program code configured to
cause a computer to recover said speech frame by:

obtaining a first current input speech frame, said frame having a start point and an
endpoint;

reconstructing said first current input speech frame from a previous input speech frame to
generate a reconstructed first current input speech frame if in response to an indication that said
first current input speech frame is lost has not been properly received;

obtaining a second current input speech frame immediately following said first current
input speech frame;

creating a time-warped current input speech frame and a time-warped reconstructed frame
from previous input speech frame by continuously time warping said second current input speech
frame and a copy of said previous reconstructed first current input speech frame to coincide a
peak of said second current input speech frame with a peak of said reconstructed first current
input speech frame while maintaining an intersection point of said second current input speech
frame with a third current input speech frame immediately following said second current input
speech frame, wherein said time warping generates a time-warped second current input speech
frame and a time-warped reconstructed first current input speech frame if said current input

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~~speech frame is correctly received and said previous input speech frame is reconstructed; and~~
creating a new second current input speech frame by overlapping-and-adding said time-warped second current input speech frame and said time-warped reconstructed first current input speech frame
~~fading simultaneously said time-warped current input speech frame and said time-warped reconstructed frame from previous input speech frame to obtain an improved current frame.~~

Claim 16 (Currently Amended): The computer program product of claim 15, wherein each of said speech frame ~~comprises~~ represents a speech signal having zero or more pitch cycles.

Claim 17 (Currently Amended): The computer program product of claim 16, wherein said continuously time warping ~~said current input speech frame and said copy of said previous input speech~~ comprises shifting one or more peaks of said pitch cycles of said second current input speech frame and one or more peaks of said pitch cycles of said ~~copy of previous reconstructed first current input speech frame~~ to provide overlap of coincide at least one of said one or more ~~pitch cycles peaks~~.

Claim 18 (Currently Amended): The computer program product of claim ~~16~~ 15, wherein said overlapping-and-adding fades-in said second current input speech frame and fades-out said reconstructed first current input speech frame ~~endpoint of said current input speech frame remains fixed during said time warping process.~~

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Claim 19 (Currently Amended): The computer program product of claim 15, wherein said reconstructing said first current input speech frame from a previous input speech frame comprises copying said previous input speech frame as said reconstructed first current input speech frame.

Claim 20 (Currently Amended): The computer program product of claim 15, wherein said previous input speech frame immediately precedes said first current input speech frame ~~said fading simultaneously said time-warped current input speech frame and said time-warped copy of previous input speech~~ comprises:

~~fading in said time-warped current input speech frame; and~~

~~fading out said time-warped copy of previous input speech.~~

Claim 21 (Currently Amended): The computer program product of claim 15, wherein said ~~fading~~ overlapping-and-adding is a linear fade operation.